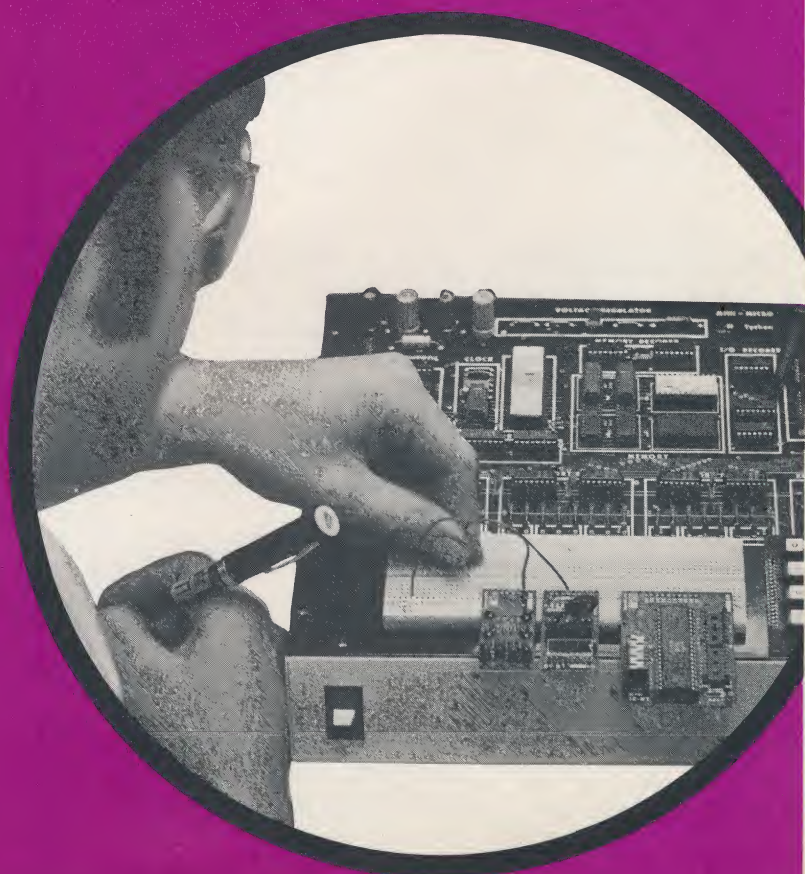


Fundamentals of MICROPROCESSING

A THREE-DAY COURSE
FOR ENGINEERS AND SCIENTISTS

WASHINGTON, D.C. SADDLE BROOK, N.J. BALTIMORE, MD.
BOSTON, MASS. NEW YORK, N.Y. JACKSONVILLE, FLA.



AMERICAN INSTITUTE FOR
PROFESSIONAL EDUCATION

Fundamentals of MICROPROCESSING

WORKSHOP LOCATIONS

WASHINGTON, June 1-3
SADDLE BROOK, June 8-10
BALTIMORE, June 13-15

BOSTON, June 22-24
NEW YORK, June 29-July 1
JACKSONVILLE, July 6-8

Seminar Description

This seminar-workshop has been developed by the Institute for those members of the engineering and scientific community whose professional growth requires more than a passing acquaintance with the microprocessor. By starting with the digital elements of the microprocessor, this course provides participants with essential insights as to how a microprocessor works.

To gain an understanding of the microprocessor, participants concentrate — first, on the digital components of the microprocessor and second, on their integration as a computing device. The method of instruction is lecture plus hands-on experiment. The hardware employed is specially designed to foster individualized experimentation and demonstrate underlying theory of digital devices.

During an intensive three days of lecture and workshop participants will:

- Learn applied digital electronics
- Develop hands-on familiarity with the fundamentals of microprocessing
- Investigate the features of his own Micro System

Who Should Attend

Research engineers, scientists, design engineers, engineering managers, instrumentation specialists, computer professionals, and educators desiring in-depth knowledge of how a microprocessor functions. *No direct experience with microprocessors or digital electronics is required.* Participants with background in these areas are, however, able to move quite rapidly through the first day's experiments. Special additional projects are assigned in such cases. Participants should have an engineering or scientific background and be able to carry out experiments under faculty direction.

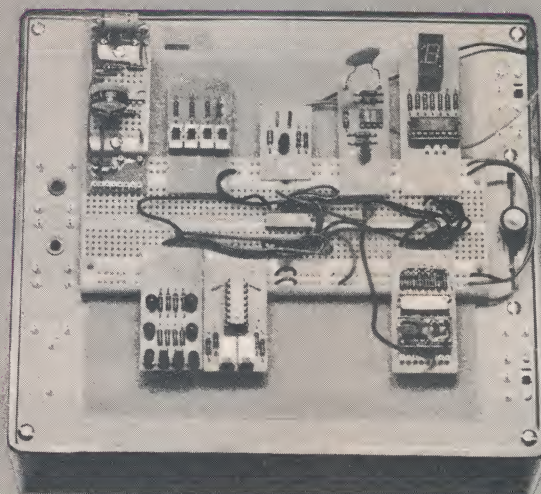
The Micro System

Each participant is given, *to retain after the course*, a Micro System which includes:

- A set of LR outboards. These are the key digital devices required to demonstrate how a microprocessor functions
- A set of auxiliary integrated circuits
- A 6 volt power source
- Accessories and associated hardware
- Reference manuals and workbooks

The Micro System is produced by E&L Instruments, Inc., the nation's leading manufacturer of experimental microprocessors. The System is compatible with E&L's complete line of microcomputing equipment.

Each participant is expected to use his Micro System in his own investigations after the seminar. Accordingly, the Micro System includes workbooks and materials for advanced individualized experimentation.



The Faculty

Dr. Joseph B. Ross. Dr. Ross is an Associate Professor of Physics at **PARK COLLEGE**. He also serves as Technical Consultant with a major chemical company. His work has included the development of training courses for engineers and scientists in such areas as: control systems logic, programmable logic controllers, microprocessor applications and digital/analog devices. He has also been involved in digital circuit design and micro-programming. He holds a Ph.D. in Solid State Physics from **PURDUE UNIVERSITY**.

Dr. Howard Boyet. Dr. Boyet is Professor of Electrical Engineering at **PRATT INSTITUTE**. He has served as a research engineer and physicist with **NASA** and **BELL TELEPHONE LABORATORIES**. Other work included assignments with **RCA ELECTRONICS** and **HEWLETT PACKARD CO.** His fields of expertise are telecommunications, digital computers, physical electronics and solid state devices. Dr. Boyet holds several patents and lectures frequently in this country and several foreign nations. He holds a Ph.D. in Physics from **NEW YORK UNIVERSITY**.

Course Schedule

DAY ONE

- 8:45 A.M. **Registration**
- 9:00-9:15 **Introduction and Instruction**
- A. Hardware
 - B. Experiments
 - C. Reference Books
- 9:15-10:00 **Hardware Introduction**
- A. Lamp Monitors
 - B. Power Supply
 - C. Logic Switch
 - D. LED Seven Segment Display
 - E. Decode Counter
- 10:00-10:15 **Coffee Break**
- 10:15-12:00 **Gating a Digital Signal**
- A. The AND Gate and NAND Gate
 - B. The OR Gate
 - C. The NOR Gate
 - D. The 4 Bit Binary Counter
- 12:00-1:00 **Luncheon**
- 1:00-3:00 **Truth Tables and Digital Applications**
- A. NAND Gates and Truth Tables
 - B. Logic States and Truth Tables
 - C. More Truth Tables (Supplemental Experiment)
 - D. OR Gates, NOR Gates and Exclusive OR Gates (Supplemental Experiment)
 - E. The Invert Gate (Supplemental Experiment)
- 3:00-3:15 **Coffee Break**
- 3:15-5:15 **The Decade Counter**
- A. The Cascade Counter
 - B. Contact Bounce, Debounced Gating
 - C. Non-Debounced Pulser
 - D. Monostable Multivibrator*
 - E. Data Selectors/Multiplexers*
 - F. The Clock Source*

*(optional project)

DAY TWO

- 9:00-10:15 **Digital Devices**
- A. BCD to Decimal Decoder
 - B. 1 to 8 Demultiplexers
 - C. Sequencing Techniques
 - D. Decode Sequencer
 - E. 4 to 1 Data Selector/Multiplexer
 - F. 16 to 1 Data Selector/Multiplexer*
- 10:15-10:30 **Coffee Break**
- 10:30-12:00 **LED Displays**
- A. Basic Operations
 - B. 7 Segment Display

- 12:00-1:00 **Luncheon**
- 1:00-2:00 **Bussing**
- A. Operation with Tri State Output
 - B. Bussing Techniques
- 2:00-3:00 **Flip Flops, Latches and Clocks**
- A. Bistable Latch
 - B. Latch a Decode Counter
 - C. Clear and Reset Operations
 - D. Comparative Techniques*
- 3:00-3:15 **Coffee Break**
- 3:15-5:15 **Memory**
- A. RAM and ROM
 - B. Read In Operation
 - C. Read Out Operation
 - D. Non Sequential Decoder*
 - E. Address Control
 - F. PROM
 - G. Programmed Logical Arrays

*(optional project)

DAY THREE

- 9:00-10:30 **Registers, Counters and Arithmetic Units**
- A. Function Generator
 - B. Arithmetic Logic Chip
 - C. Binary Full Adder
 - D. Eight-bit Shift Register*
 - E. Up-Down Counter*
- 10:30-10:45 **Coffee Break**
- 10:45-12:30 **Asynchronous Communications**
- A. ASCII Coding
 - B. TTY Interface, Parts
 - C. CRT Termination
 - D. Controller's Function
 - E. Practical Interfacing
 - F. Data Transmission
 - G. Interfacing Exercise*
- 12:30-1:30 **Luncheon**
- 1:30-3:30 **Features of Microcomputers**
- A. Stored Instructions
 - B. Constituent Parts
 - C. Control Signals
 - D. Bussing
 - E. Program Control
- 3:30-3:45 **Coffee Break**
- 3:45-4:30 **Additional Investigation**
- A. Bug Book II A
 - B. Hardware Specification
 - C. Microprocessors: Real-time
 - D. Microprocessor Software

*(optional project)

Fundamentals of MICROPROCESSING

Washington, D.C., June 1-3
 Ramada Inn
 901 N. Fairfax Street
 Alexandria, Virginia 22314
 (703) 683-6000

Saddle Brook, N.J., June 8-10
 Howard Johnson Motor Lodge
 Garden St. Pkwy., Exit 159, I-80
 Saddle Brook, N.J. 07662
 (201) 845-7800

Baltimore, Md., June 13-15
 Friendship International Hotel
 Friendship International Airport
 Baltimore, Maryland 21240
 (301) 761-7700

Boston, Mass., June 22-24
 Ramada Inn
 Route 128 and Main Street
 Woburn, Mass. 01801
 (617) 935-8760

New York, N. Y., June 29-July 1
 New York Sheraton
 7th Avenue at 56th Street
 New York, N.Y. 10019
 (212) 247-8000

Jacksonville, Fla. July 6-8
 Holiday Inn-Jacksonville Airport
 I-95 at Airport Road AMF
 Jacksonville, Fla. 32229
 (904) 757-3110

INFORMATION FOR REGISTRANTS

COURSE FEES: The registration fee of \$595 includes the seminar, the Micro System, and a complete set of reference materials. Luncheons and refreshments are provided by the Institute.

REGISTRATION: Attendance level is limited and sessions tend to fill up well in advance of workshop dates. Reservations will be confirmed in the order received. To register, mail the registration form or phone as soon as possible. Should you be unable to attend, please notify the Institute seven days before the seminar to avoid a \$125 cancellation charge. Substitutions or transfers can be arranged at any time at no additional charge. To register by phone please dial 201-377-7400.

HOTEL ACCOMMODATIONS: Contact the hotel directly and reserve a room. **IMPORTANT!** To receive the group discount on your room rate, please inform the hotel that you are attending an Institute seminar.

COURSE SCHEDULE: Classes are held from 9:00 A.M. to 5:00 P.M. each day. No evening sessions are scheduled. Students are given overnight assignments requiring one hour of preparation time.

ADVANCED COURSES IN MICROPROCESSING

Microprocessor Design. This three-day seminar explores software development, interfacing, and I/O expansion techniques. At the request of the faculty, admission to this course is limited to graduates of **Fundamentals of Microprocessing**.

In addition, the Institute offers three programs dealing with higher-level applications:

- **Instrumentation Applications of the Microprocessor**
- **Medical Health Applications of Microprocessing**
- **Communications Applications of Microprocessors**

For further information about these seminars, please contact the Institute's Educational Director.

2.1 CEU'S AWARDED

Those participants who successfully complete the course requirements are awarded 2.1 Continuing Education Units.

As the national standard for the recognition of non-university professional education, the CEU has been adopted by the extension divisions of over 600 colleges, by numerous professional associations, and by other specialized educational groups. A permanent record of CEU awards is maintained by the Institute.

IN-HOUSE SESSIONS AVAILABLE

Please contact Mr. Donald S. Brightly, President, American Institute for Professional Education for details of in-house training sessions for groups of 15 to 25 professionals.

ABOUT THE INSTITUTE

The American Institute for Professional Education, founded in 1972, is a non-profit organization which serves the advanced educational needs of professionals. It provides interdisciplinary programs unlike those available through other channels. These programs are directed at the information needs engendered by today's rapid rate of technological change.

Fundamentals of MICROPROCESSING

TYPE OF REGISTRATION CHOICE OF SESSION

☐ **Single \$595**

☐ **Multiple**

(See Discount Schedule)

☐ Washington, June 1-3

☐ Saddle Brook, June 8-10

☐ Baltimore, June 13-15

☐ Boston, June 22-24

☐ New York, June 29-July 1

☐ Jacksonville, July 6-8

METHOD OF PAYMENT

☐ **Check Enclosed**

☐ **Bill My Firm**

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